Dec. 28, 1943. H. HEMMERICH 2,338,075

FOOT CONSTRUCTION OF FULL-FASHIONED HOSIERY

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Fig. 1.

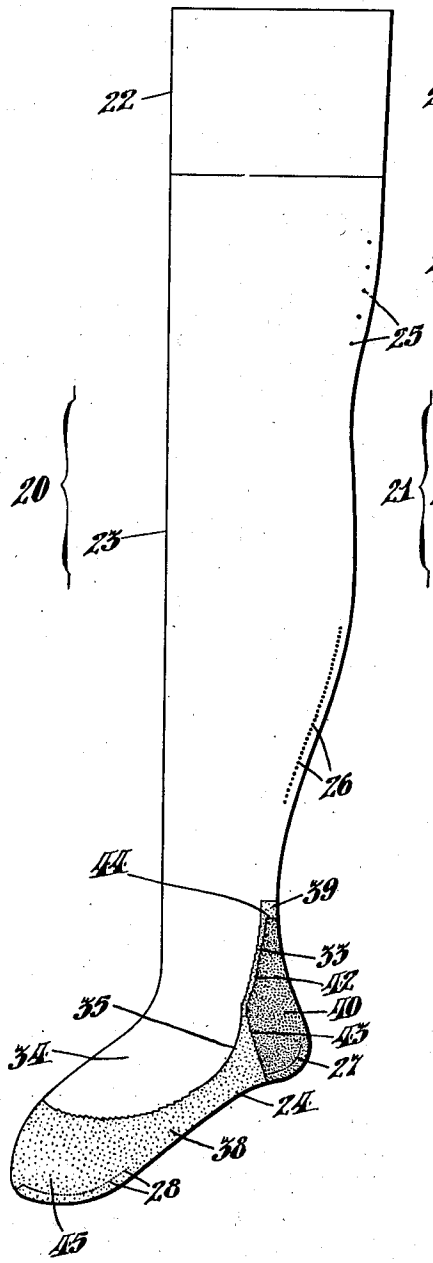
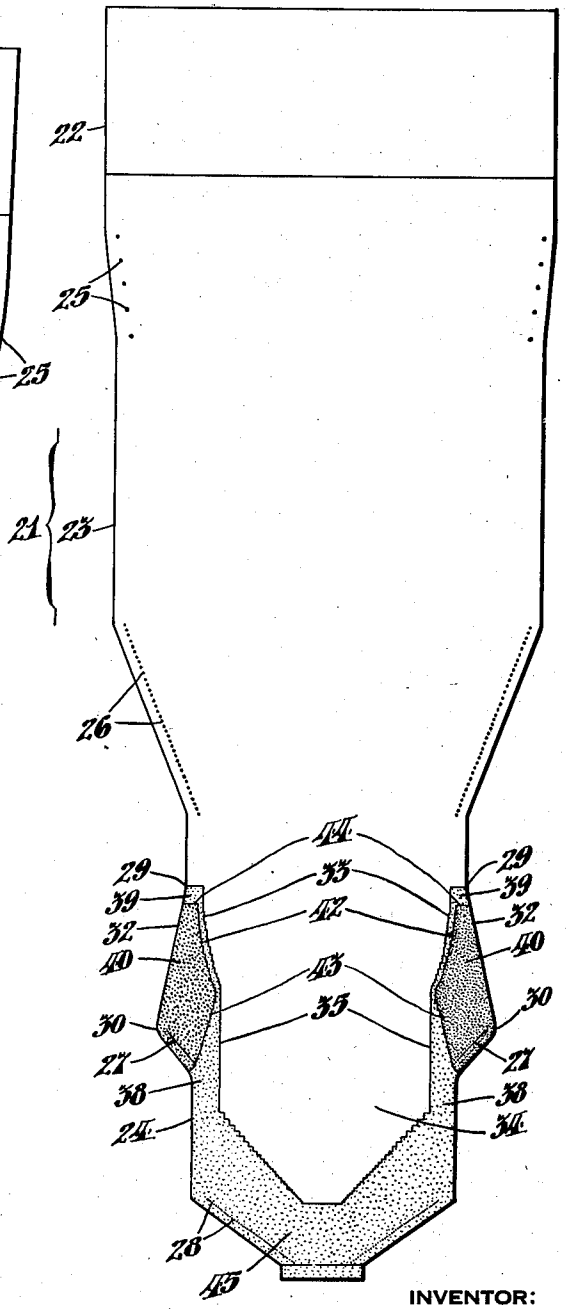


Fig. 2.



INVENTOR:
Hugo Hemmerich,
BY
Albert E. Jenkins
ATTORNEY.

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FIG. 3.

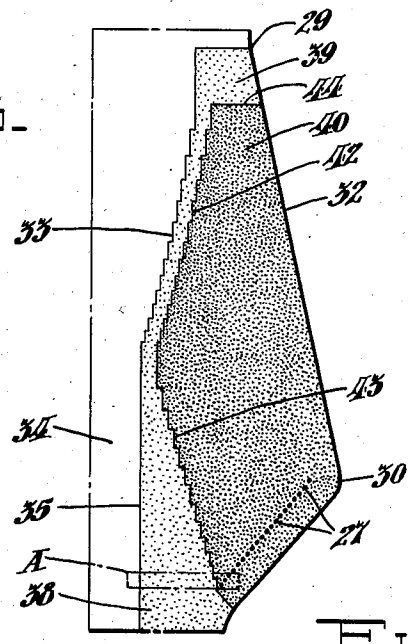
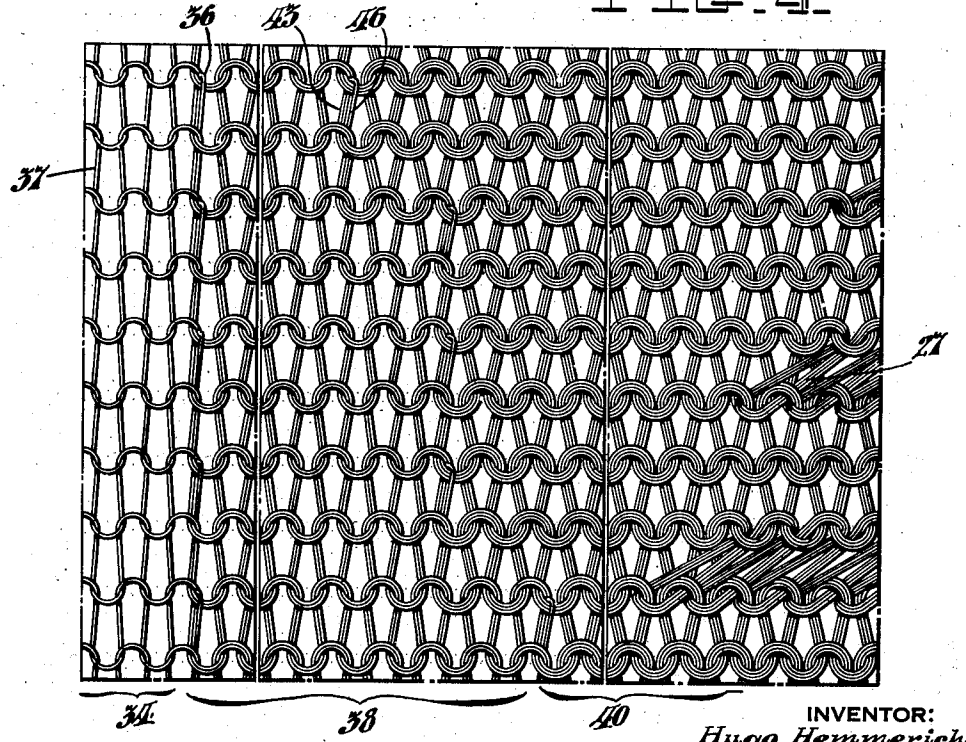


FIG. 4.



INVENTOR:
Hugo Hemmerich,
BY Alfred E. Oschinger
ATTORNEY.

Dec. 28, 1943. H. HEMMERICH 2,338,075

FOOT CONSTRUCTION OF FULL-FASHIONED HOSIERY

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FIG. 5.

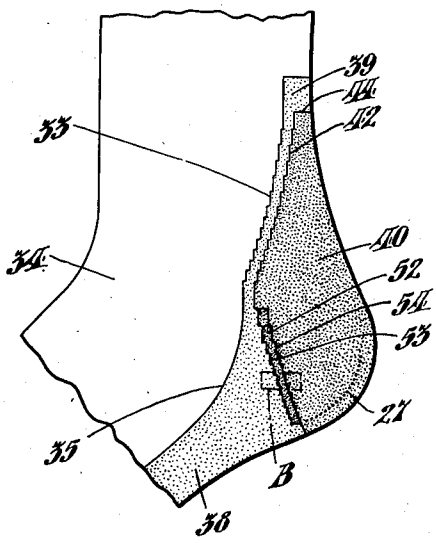


FIG. 6.

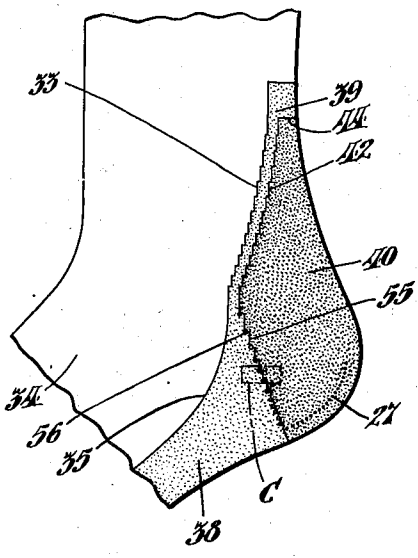


FIG. 7.

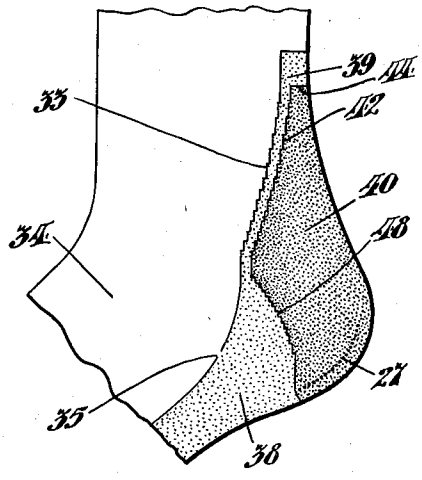
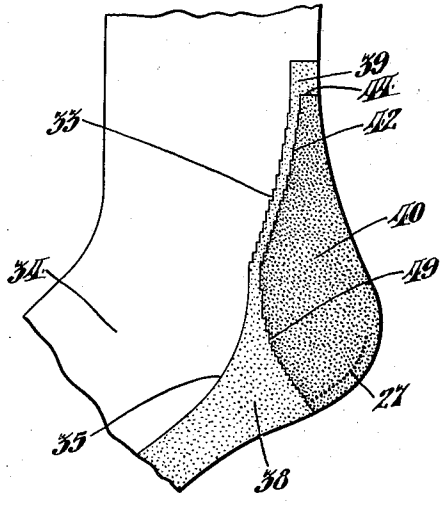


FIG. 8.



INVENTOR:
Hugo Hemmerich,
BY
Alfred E. Ostlinger
ATTORNEY.

Dec. 28, 1943. H. HEMMERICH 2,338,075

FOOT CONSTRUCTION OF FULL-FASHIONED HOSIERY

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Fig. 9.

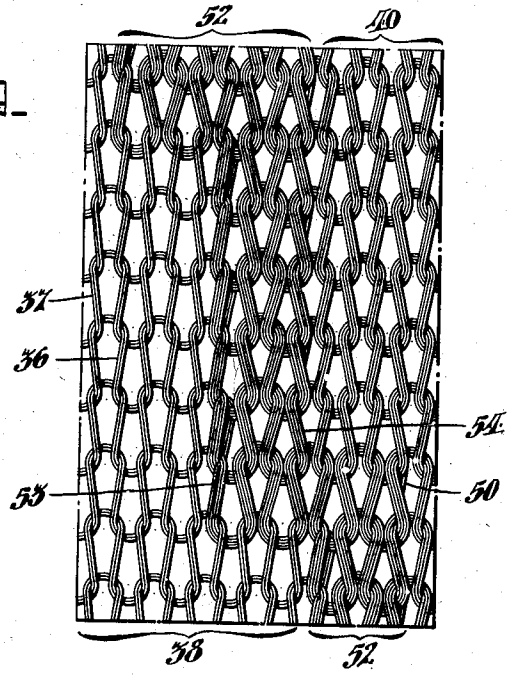


Fig. 10.

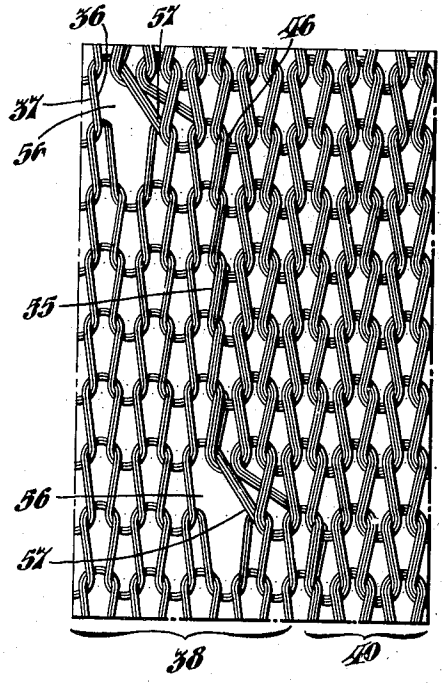
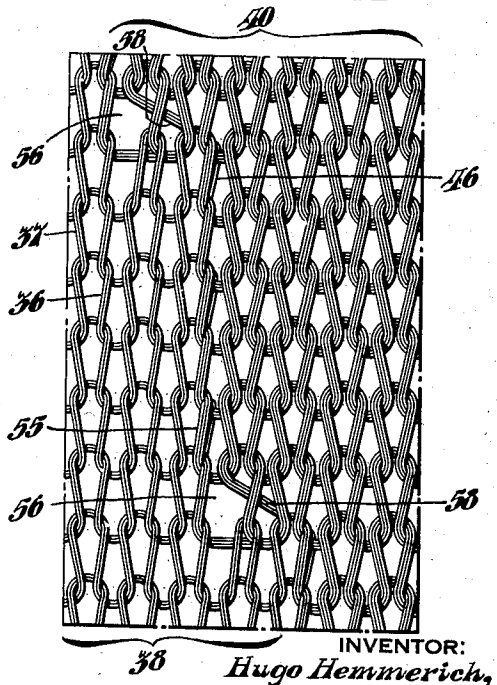


Fig. 11.



INVENTOR:
Hugo Hemmerich,
BY
Alfred E. Ackinger,
ATTORNEY.

Patented Dec. 28, 1943

2,338,075

UNITED STATES PATENT OFFICE

2,338,075

FOOT CONSTRUCTION OF FULL-FASHIONED HOSIERY

Hugo Hemmerich, Reinholds, Pa., assignor to Berkshire Knitting Mills, Wyomissing, Pa., a corporation of Pennsylvania

Application March 13, 1941, Serial No. 383,105

7 Claims. (Cl. 66—182)

This invention relates to full-fashioned hosiery, and more particularly to single unit full-fashioned hosiery and to an improved foot construction therefor.

When producing a conventional full-fashioned hosiery blank in accordance with the well known two-machine method, the leg portion is knitted on a legger machine and is then transferred to the needles of a footer machine for the knitting of the foot portion thereto. Full-fashioned hosiery which is produced on separate legger and footer machines includes a distinct line of termination, generally referred to as a "change row," or "heel suture line," which forms a line of juncture between each heel tab and the sole portion. In the finished stocking, this line of juncture forms the boundary line of a reinforced heel pocket structure which is shaped to snugly fit the heel of the wearer so as to prevent slippage or displacement thereof and which serves to anchor the stocking at this point. In conventional hosiery, this snugly fitting heel pocket comprises the separate reinforced heel tabs which extend around opposite sides of the heel and meet in a connecting line centrally at the bottom and back of the heel. Such heel pockets are also present in full-fashioned hosiery produced on combination legger-footer and heeler machines.

In the manufacture of so-called "single unit stockings" in which the complete stocking blanks are formed on a single knitting machine, and in which the sole portions are knit as direct walewise continuations of widened heel portions, no heel suture line is formed. Since the referred to change row or heel suture line has heretofore served as a means of identifying full-fashioned hosiery, it will be realized that its omission from single unit hosiery has a tendency to confuse purchasers into believing that such hosiery is not fully fashioned. Furthermore, the absence of a reinforced heel pocket construction in such hosiery corresponding with that found in hosiery produced by the multi-machine methods, heretofore seriously affected their comparative rank in the hosiery market.

It is an object of my invention to provide a single unit stocking with an improved heel construction which overcomes the aforesaid difficulties, and results in a heel cup which in appearance, construction and function is substantially the same as that heretofore only obtainable in hosiery made in accordance with the referred to and other multi-machine methods.

Another object is to provide a novel method of effecting a line of termination between the heel and sole portions of single unit full-fashioned stockings substantially corresponding in length and position to the heel suture line of conventional full-fashioned hosiery made on separate machines, as on legger and footer machines, or on combination legger-footer and heeler machines.

Among further objects of my invention are to provide a single unit full-fashioned hosiery foot construction comprising heel and sole areas of different densities arranged to effect a line of termination therebetween; to accentuate the appearance of such line of termination as by modifying the construction of certain loops defining such line and/or by increasing the density of such line over that of the remaining heel and sole areas.

With these and other objects in view which will become apparent from the following detailed description of the illustrative embodiments of my improved single unit full-fashioned hosiery construction disclosed in the accompanying drawings, my invention resides in the novel fabrics, hosiery and the method of producing the same as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a side view of a full-fashioned stocking embodying my invention;

Fig. 2 illustrates a full-fashioned stocking blank from which the stocking of Fig. 1 is produced;

Fig. 3 is an enlarged detail view of a portion of Fig. 2;

Fig. 4 is an enlarged view showing the structure of the fabric within the dot-and-dash rectangle A of Fig. 3;

Figs. 5, 6, 7 and 8 show different heel constructions of single unit stockings produced in accordance with my invention;

Fig. 9 is a view similar to Fig. 4, showing the structure of the fabric within the dot-and-dash rectangle B of Fig. 5;

Fig. 10 is a view similar to Fig. 4 showing the structure of the fabric within the dot-and-dash rectangle C of Fig. 6; and

Fig. 11 is a view similar to Fig. 10, showing a modification of the fabric structure of Fig. 10.

In the different forms of the invention herein disclosed, unless otherwise indicated, corresponding parts of the various embodiments are similarly constructed in part and are accordingly identified by similar reference characters.

Referring more paricularly to Figs. 1–4 of the drawings, a typical embodiment of my invention

is there shown in the form of a single unit full-fashioned stocking **20**. This stocking is made from a blank **21** which includes a folded welt **22**, a leg portion **23**, and a foot portion **24**, all of which parts are knitted as direct walewise continuations of each other in the sequence set forth on one and the same single unit full-fashioned knitting machine. Knee narrowings **25**, leg narrowings **26**, heel narrowings **27** and toe narrowings **28** are provided in the stocking **20** to fashion it to the shape of the leg of the wearer, whereas the fabric is widened by progressively increasing the length of coursewise travel of the yarn carriers between the walewise spaced points **29** and **30** in heel portions **39** to further fashion the stocking to the width needed in this region of the stocking. Reinforcing of the heel **39**, sole **38** and toe portions **45** of such a full-fashioned stocking is usually effected by feeding a main reinforcing yarn or thread **36** across these entire portions in addition to the body yarn **37**, in turn fed across the entire width of the stocking between the selvedges **32**. Up to this point, the procedure followed is in accordance with the present known practice of knitting a full length single unit or other full-fashioned stocking.

To effect a line of termination in such single unit hosiery in accordance with my invention, so as to simulate the heel suture line of hosiery produced either on two separate machines, such as on legger and footer machines, or on combination legger-footer and heeler machines, an additional reinforcing yarn is utilized throughout an area **40** of the heel **39** during the knitting of the stocking blank **21**. This triple thread area **40** is formed by beginning at the course **44** and progressively varying the distance travelled by the additional reinforcing yarn, as from the selvedge **32** to the boundary defined by the stepped lines **42** and **43**, Figs. 1, 2 and 3. The upper stepped boundary line **42** of the portion **40** is preferably so arranged that it parallels the adjacent portion of the stepped boundary line **33** of the heel **39**, whereas a simulated heel suture line **43**, which marks the lower boundary of both the heel **39**, and the area **40** thereof, is substantially parallel to the selvedge edge **32** of the upper portion of the heel **39**, and is angularly arranged with respect to the inner boundary line **35** of the sole portion **38**, diverging from the upper stepped line **42** so as to extend into the selvedge **32** of the fabric in the manner best illustrated in Fig. 3.

Stroke limiting means for the reinforcing carriers to progressively vary the distance which the reinforcing yarns are fed from the selvedge edge of the blank, as indicated by stepped lines **42** and **43** shown in Fig. 2, may be effected by usual mechanism of a full-fashioned knitting machine, such as the well known reinforced selvedge attachment, shown and described in The "Reading" Full-Fashioned Knitting Machine Parts Catalog—published and copyrighted by the Textile Machine Works in 1929, 1935 and 1940, respectively.

The structure which effects the line of termination **43**, is illustrated on a greatly enlarged scale in Fig. 4. As there shown, the body yarn or thread **37** which is used to form the main body of the fabric, including the instep **34**, is also used in forming the loops of the sole portion **38** and the heel area **40**, being fed from selvedge to selvedge thereby passing across the line of termination **43** and beyond the heel narrowings **27** to the selvedge **32** of the fabric. The main reinforcing yarn or thread **36** is combined with body yarn **37** from the line **35** across the sole portion **38** to the selvedge of the fabric to form a double or two-ply yarn area; whereas, another reinforcing yarn **46** is combined with the body yarn **37** and the main reinforcing yarn **36** from the stepped lines **42** and **43** to the selvedge **32** to effect a triple or three-ply yarn structure throughout the area **40** of the heel **39**. The inner termination of the extra or second reinforcing yarn **46** along the stepped lines **42** and **43** marks the inner boundary of the three-ply or triple yarn reinforced portion **40** of the heel **39**, and it is the contrasting appearance of the triple yarn reinforced portion **40** relative to the double yarn reinforced sole portion **38** resulting from the relatively different densities thereof which effects the line **43** which is substantially parallel to the selvedge edge **32** of the upper portion of the heel. It is this line of termination **43** between the heel and sole areas which simulates the change row or heel suture line of conventional full-fashioned hosiery.

In the modifications of the invention shown in Figs. 5–11, the extra yarn reinforcement of the structure shown in Figs. 1–4 is also employed to effect a line of termination simulating the change row or heel suture line of two-machine stockings, the heel structures of Figs. 7 and 8 illustrating this simulated heel suture line in different contours which may be desired in order to impart a slenderizing or other desired effect to the ankle of the wearer; an inwardly curved simulated heel suture line or change row **48** (Fig. 7) and an outwardly curved simulated heel suture line, or change row **49** (Fig. 8), being illustrated as modifications of the row **43** shown in Figs. 1–4.

In addition to the triple of three-ply yarn reinforced heel constructions of Figs. 1, 2, 3, 4, 7 and 8, the heel constructions of Figs. 5, 6, 9, 10 and 11 have additional features associated therewith to further accentuate the appearance of the lines of termination or the simulated heel suture lines thereof which substantially correspond in length and position to the heel suture lines of conventional full-fashioned hosiery.

In the heel construction shown in Figs. 5 and 9 an additional reinforcing yarn **50** is employed to reinforce a narrow strip between the lower boundary of the area **40** and the sole portion **38**. This narrow four-yarn strip or area **52** is defined by stepped rows or lines **53** and **54** which are substantially parallel to the upper selvedge **32** of the heel **39** and which respectively define the front and back boundary lines of said area. The lines **54** and **42** mark the front boundary line of the triple thread area **40**. The strip **52** has a contrasting appearance relative to the sole **38** and the remainder of the area **40**, which in turn have a constrasting appearance relative to each other, and thereby effects a line of termination between the heel and sole areas.

In the heel construction shown in Figs. 6, 10, and 11, openwork areas **56** are produced by modifying the structure of certain loops to provide other than plain loops in the line of termination or simulated heel suture line **55** (Fig. 6). Transferred loops **57** (Fig. 10) and spread or non-run loops **58** (Fig. 11), are among the forms of loops adapted to further accenuate the prominence of the line of termination between the heel and sole areas of single unit stockings effected by areas of contrasting appearance. The heel and sole portions of this construction, as in the previously

described forms of the invention, have a contrasting appearance relative to each other which effects the line of termination **55** which is substantially parallel with the upper selvedge edge of the heel area.

As more particularly illustrated by Fig. 4, the heel narrowings **27**, which are formed following the widening of the stocking from point **29** to point **30** to fashion the heel to the desired contour, are shown as being of a two-needle construction although other known forms of narrowing, such as single needle narrowing, may be employed to effect the necessary fashioning in this area.

Having knitted a stocking blank in conventional manner to the heel section, and having completed one or the other of the described heel sections in accordance with my invention, knitting of the foot portion of the stocking is continued and accomplished in the known conventional manner followed in the practice of producing single unit and other forms of full-fashioned hosiery.

Although the invention is illustrated in connection with a lady's full length single unit full-fashioned stocking having full length welt and leg portions, my improvements are, of course, also adapted to other types of single unit hosiery, such for example, as ladies' knee length hosiery, men's socks, etc.

It is, of course, to be understood that the improvements shown and described, by which I obtain the desired results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a single unit full-fashioned hosiery blank, a foot construction comprising reinforced heel and sole portions of relatively different densities arranged to provide a contrasting appearance therebetween, and an additional reinforcement defining the boundary line between said heel and sole portions.

2. A method of manufacturing a full-fashioned hosiery blank, comprising forming the blank to the heel areas in conventional manner, knitting reinforced heel and sole areas as direct walewise continuations of each other, feeding an additional reinforcing yarn during the formation of part of each heel area and feeding each such reinforcing yarn to terminate in a line substantially parallel to the upper selvedge edge of the respective reinforced heel area, feeding still another reinforcing yarn during the formation of each heel area to reinforce the loops defining said line, and completing the blank in conventional manner.

3. A flat knitted stocking blank composed essentially of yarns interengaged in transverse courses of stitches and parallel stitch wales and comprising a body portion, foot-sole portions of heavier yarn weight than said body portion, and heel portions of heavier yarn weight than said foot-sole portions and having widening and narrowing selvages, the yarns knitted to effect a line of division at an angle to the wales and courses between each foot-sole and adjacent heel portions extending to the edge of the blank at a point near the lower end of said narrowing selvage.

4. A method of manufacturing a full-fashioned hosiery blank free of stitches to be looped comprising forming the blank to the heel areas in conventional manner essentially of successively interknit transverse courses of stitches and parallel longitudinal stitch wales, knitting heel and sole areas of different densities and as direct walewise continuations of each other, reinforcing a part of each heel area heavier than the adjacent sole area, progressively varying the distance of feed of the yarn for said heel and sole areas to provide successively widening and narrowing selvages for the heel portions and to effect lines of division between the heel and sole areas beginning at points near the lower ends of said narrowing selvages and running upwardly and inwardly therefrom at angles to the wales and courses.

5. A single-unit stocking formed from a flat knit full-fashioned blank including a leg portion and a foot portion and comprising a central instep portion projecting into the foot portion from the leg portion, a toe portion between the lower transverse edge of the instep and a transverse terminal edge of the blank, a heel portion between each longitudinal edge of the instep and one of the longitudinal marginal edges of the blank where the leg and foot portions join, and a foot sole portion at each side of the blank between said longitudinal edges of the blank and said longitudinal edges of said instep and extending from said toe to said heel portions, said blank comprising successively interknit transverse courses of stitches and parallel longitudinal stitch wales, said heel portions having parts thereof extending beyond the longitudinal edges of said leg and foot portions and composed of stitch wales of varying lengths added to said longitudinal edges of the blank, said added wales formed by courses which are first progressively lengthened and then progressively shortened in the direction from welt to toe while the progressively shortened courses have closed selvages and include narrowing fashion marks causing a rounded heel in the finished stocking, said leg and instep portions being composed of a fabric of one predetermined yarn-weight, said heel portions comprising fabric of a relatively heavier yarn-weight and said foot sole portions comprising fabric of an intermediate yarn-weight, with the lines of division between said heel portions and the respectively adjacent foot sole portions each extending at an angle to said wales and courses substantially from said longitudinal edges of said instep portion to said longitudinal edges of the blank.

6. A single unit full-fashioned stocking formed from a blank including a leg portion and a foot-portion and comprising a central instep portion projecting into the foot portion from the leg portion, a toe portion between the lower transverse edge of the instep and a transverse terminal edge of the blank, a heel portion between each longitudinal edge of the instep and one of the longitudinal marginal edges of the blank where the leg and foot portions join, and a foot sole portion at each side of the blank between said longitudinal edges of the blank and said longitudinal edges of said instep and extending from said toe to said heel portions, said blank comprising successively interknit transverse courses of stitches and parallel longitudinal stitch wales, said heel portions having parts thereof extending beyond the longitudinal edges of said leg and foot portions and composed of stitch wales of varying lengths added to said longitudinal edges of the blank, said added wales formed by courses which are first progressively lengthened and then progressively shortened in the di-

rection from welt to toe while the progressively shortened courses have closed selvages and include narrowing fashion marks causing a rounded heel in the finished stocking, said leg and instep portions being composed of a fabric of one predetermined yarn-weight, said heel portions comprising uniform integral fabric of a relatively heavier yarn-weight and said foot-sole portions comprising fabric of an intermediate yarn-weight, with the yarns arranged to effect lines of division between said heel portions and the respectively adjacent foot-sole portions extending at an angle to the wales and courses from the longitudinal edges of the blank at points near the lower ends of said heel portions toward said longitudinal edges of the instep portion.

7. In a knitted single unit full-fashioned hosiery blank, a foot construction comprising heel and sole areas relatively of different densities, the juncture of said areas arranged to effect a line of termination therebeween substantially corresponding in length and position to the heel suture line of the conventional full-fashioned hosiery blank, said heel areas having parts thereof extending beyond the longitudinal edges of the foot portion and composed of stitch wales of varying lengths added to the longitudinal edges of the blank, said added wales formed of courses which are first progressively lengthened and then progressively shortened in the direction of knitting while the progressively shortened courses have closed selvedges and include fashion marks causing a rounded heel in the finished stocking.

HUGO HEMMERICH.